

Monthly Marine Biotoxin Report

December 2013

Technical Report No. 13-27

INTRODUCTION:

This report provides a summary of biotoxin activity for the month of December, 2013. Ranges of toxin concentrations are provided for the paralytic shellfish poisoning (PSP) toxins and for domoic acid (DA). Estimates are also provided for the distribution and relative abundance of *Alexandrium*, the dinoflagellate that produces PSP toxins, and *Pseudo-nitzschia*, the diatom that produces domoic acid. Summary information is also provided for any quarantine or health advisory that was in effect during the reporting period.

Please note the following conventions for the phytoplankton and shellfish biotoxin distribution maps: (i) All estimates for phytoplankton relative abundance are qualitative, based on sampling effort and percent composition; (ii) All toxin data are for mussel samples, unless otherwise noted; (iii) All samples are assayed for PSP toxins; DA analyses are performed as needed (i.e., on the basis of detected blooms of the diatoms that produce DA); (iv) Please refer to the appropriate figure key for an explanation of the symbols used on the maps.

Southern California Summary:

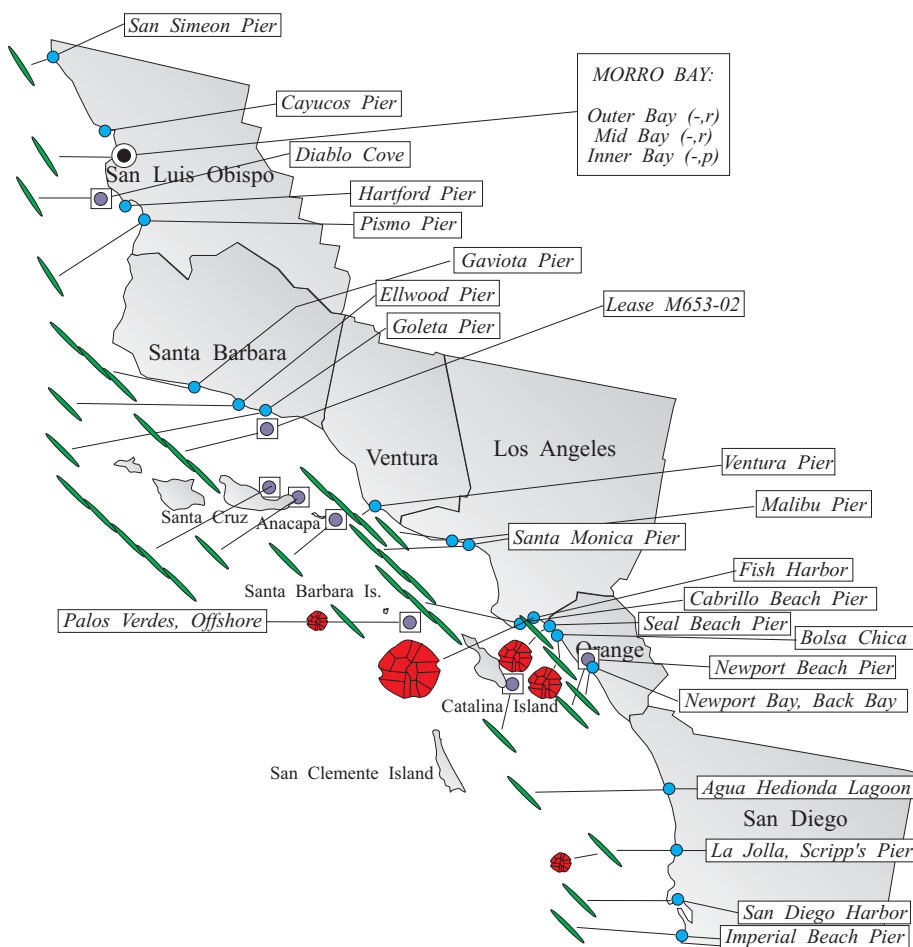
Paralytic Shellfish Poisoning

Alexandrium was observed at several sampling locations between Los Angeles and San Diego counties (Figure 1). Exceptionally high relative abundances were observed at Fish Harbor, Seal Beach Pier, and Bolsa Chica.

Mussels collected on December 16 and 19 by

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Figure 1. Distribution of toxin-producing phytoplankton in Southern California during December, 2013.



Relative Abundance of Known Toxin Producers

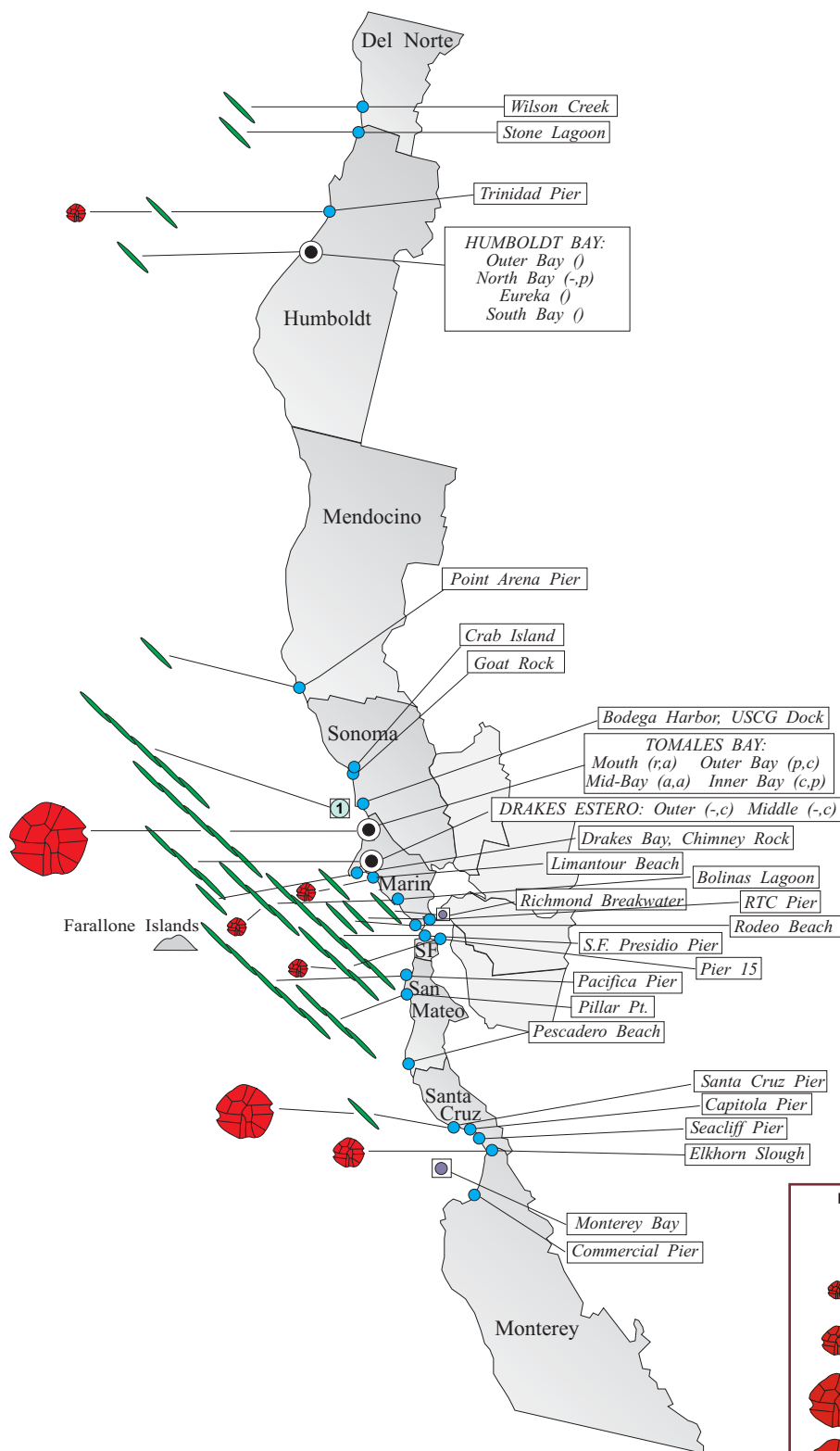
Alexandrium Species		Pseudo-nitzschia Species	
	Rare (less than 1%)		Present (less than 10%)
	Present (between 1% and 10%)		Common (between 10% and 50%)
	Common (between 10% and 50%)		Abundant (greater than 50%)
	Abundant (greater than 50%)		

MONTHLY SAMPLING STATIONS:

For areas with multiple sampling stations, species abundance at each station is represented as follows:
(a,p) = Abundance for *Alexandrium* and *Pseudo-nitzschia*.
e.g., (c,p) = common, present; (a,-) = abundant, not observed

- Single Sampling Station
- Multiple Sampling Stations
- Offshore Sampling Station

Figure 2. Distribution of toxin-producing phytoplankton in Northern California during December, 2013.



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the Southern California Marine Institute at Fish Harbor contained PSP toxin concentrations well above the alert level: 492 and 860 ug/100 g, respectively (Figure 3).

Domoic Acid

Pseudo-nitzschia was observed along the entire southern California coast (Figure 1). The relative abundance of this diatom declined at most sites but increased offshore at Santa Cruz Island and at sites in Ventura and Los Angeles. The highest relative abundance of *Pseudo-nitzschia* was at Pelican Bay on Santa Cruz Island (December 26).

Domoic acid was not detected in bivalve shellfish (Figure 3). Rock crab viscera samples from nearshore Santa Barbara contained low or nondetectable levels of this toxin and samples from the Channel Islands contained low to high concentrations (3 to 160 ppm).

Non-Toxic Species

The diatom *Chaetoceros* was ubiquitous along the coast. The dinoflagellate *Ceratium* was common at sites between San Luis Obispo and Santa Barbara.

Northern California Summary:

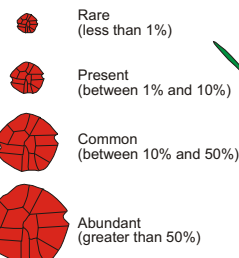
Paralytic Shellfish Poisoning

Alexandrium was detected at several locations, increasing significantly in relative abundance inside Tomales Bay and in Monterey Bay (Figure 2). Large numbers of this dinoflagellate occurred throughout

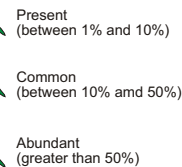
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Relative Abundance of Known Toxin Producers

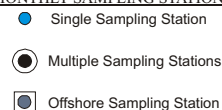
Alexandrium Species



Pseudo-nitzschia Species



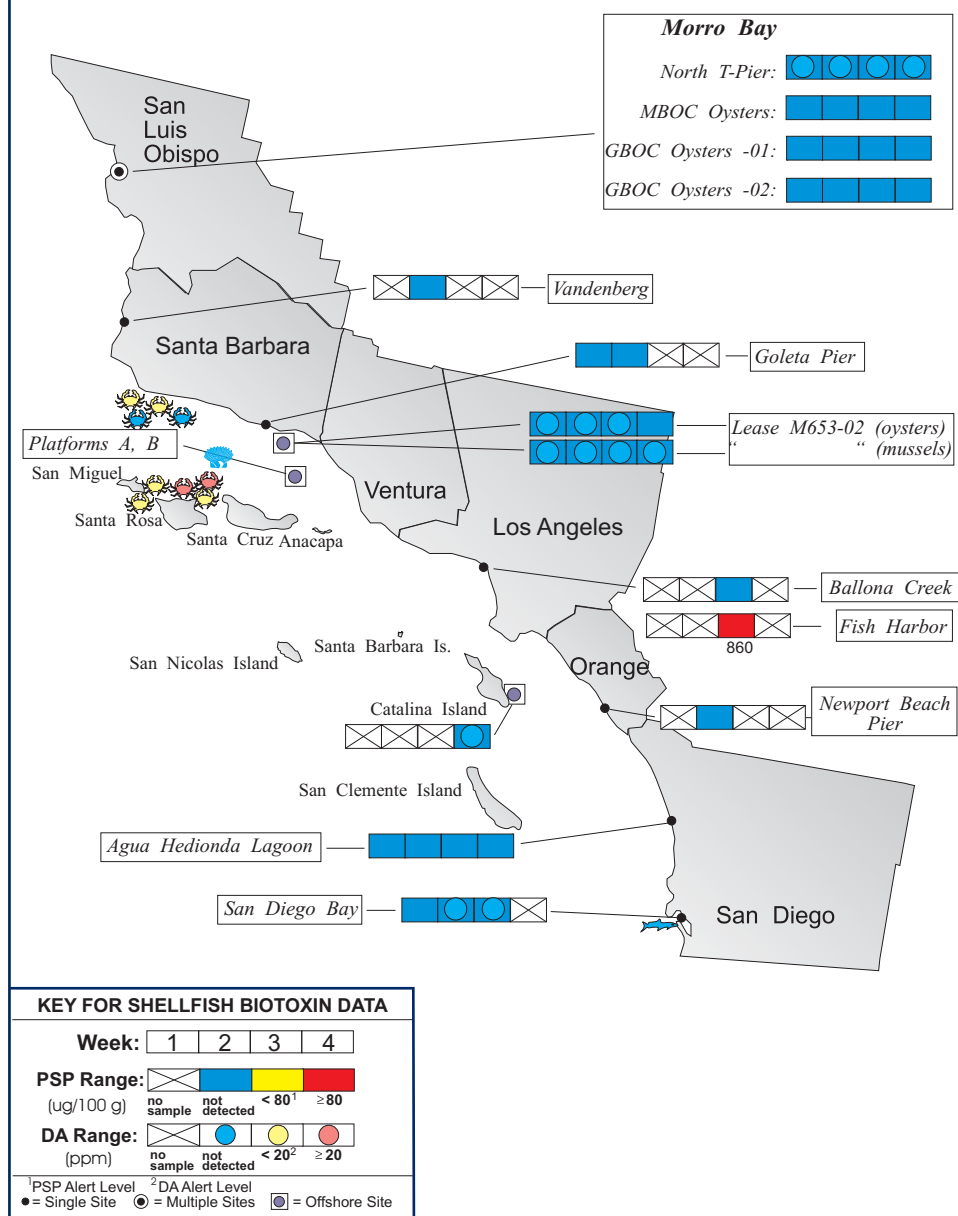
MONTHLY SAMPLING STATIONS:



For areas with multiple sampling stations, species abundance at each station is represented as follows:

(A,P) = Abundance for *Alexandrium* and *Pseudo-nitzschia*.
e.g., (c,p) = common, present; (a,-) = abundant, not observed

Figure 3. Distribution of shellfish biotoxins in Southern California during December, 2013.



(Continued from Page 2)

Tomales Bay, with the highest numbers observed in the mid-bay region near Marshall and the lowest numbers in the Walker Creek delta area of the outer bay. Increased phytoplankton sampling by program participants detected the expanding distribution of *Alexandrium* throughout the bay, as discussed below. The low level of toxins detected inside Tomales Bay in November increased dramatically through most of December (Figure 4). It is unusual for alert levels of the PSP toxins to occur in Tomales Bay and, when they have been detected, the pattern has historically been for offshore events to be carried into the bay with prevailing currents, moving no farther than the outer bay. The current event was unique in that it originated in the inner bay in the absence of any toxicity detected along the open coast of Marin. Alert levels were first detected in shellfish between Millerton Pt. and Marconi Cove. As toxin levels increased at Marconi Cove the area of impact expanded towards the mid and outer bays, reaching the latter area by the end of the month. In a separate event that began the last week of November, sentinel mussels from Santa Cruz Pier remained highly toxic through the first two weeks of December before starting to decline. Elsewhere, PSP toxin levels continued to decline at sites in Humboldt and Del Norte counties.

(Continued on Page 4)

The Marine Biotoxin Monitoring and Control Program, managed by the California Department of Public Health, is a state-wide effort involving a consortium of volunteer participants. The shellfish sampling and analysis element of this program is intended to provide an early warning of shellfish toxicity by routinely assessing coastal resources for the presence of paralytic shellfish poisoning (PSP) toxins and domoic acid.

The Phytoplankton Monitoring Program is a state-wide effort designed to detect toxin producing species of phytoplankton in ocean water before they impact the public. The phytoplankton monitoring and observation effort can provide an advanced warning of a potential toxic bloom, allowing us to focus sampling efforts in the affected area before California's valuable shellfish resources or the public health is threatened.

For More Information Please Call:
(510) 412-4635

For Recorded Biotoxin Information Call:
(800) 553-4133

(Continued from Page 3)

Domoic Acid

High relative abundances of *Pseudo-nitzschia* continued to be observed at sites between Sonoma and San Mateo counties (Figure 2).

Non-Toxic Species

The diatom *Chaetoceros* was abundant along most of the coast. The dinoflagellate *Ceratium furca* was common throughout Tomales Bay.



QUARANTINES: On December 13 a Health Advisory was issued, warning consumers to avoid all sport-harvested shellfish from Monterey Bay and portions of Tomales Bay due to elevated PSP levels.

On December 20 an additional Health Advisory was issued, warning consumers to avoid all sport-harvested shellfish from Los Angeles County, between Pt. Cabrillo and the Orange County line, due to high PSP levels in this area. This advisory also expanded the Tomales Bay warning to include the entirety of the bay.

The annual mussel quarantine ended at midnight on October 31 for all coastal counties except for northern Humboldt County. The quarantine on sport-harvested mussels was extended from the northern jetty at the entrance to Humboldt Bay to the Humboldt-Del Norte county line as a result of persistent high levels of the PSP toxins.

The September 14 health advisory for the northern Channel Islands remained in effect. The advisory warned consumers to avoid eating bivalve shellfish or the internal organs of crab, lobster, and small finfish like sardines and anchovies from the affected region due to persistent elevated levels of domoic acid in crab viscera samples.

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Figure 4. Distribution of shellfish biotoxins in Northern California during December, 2013.

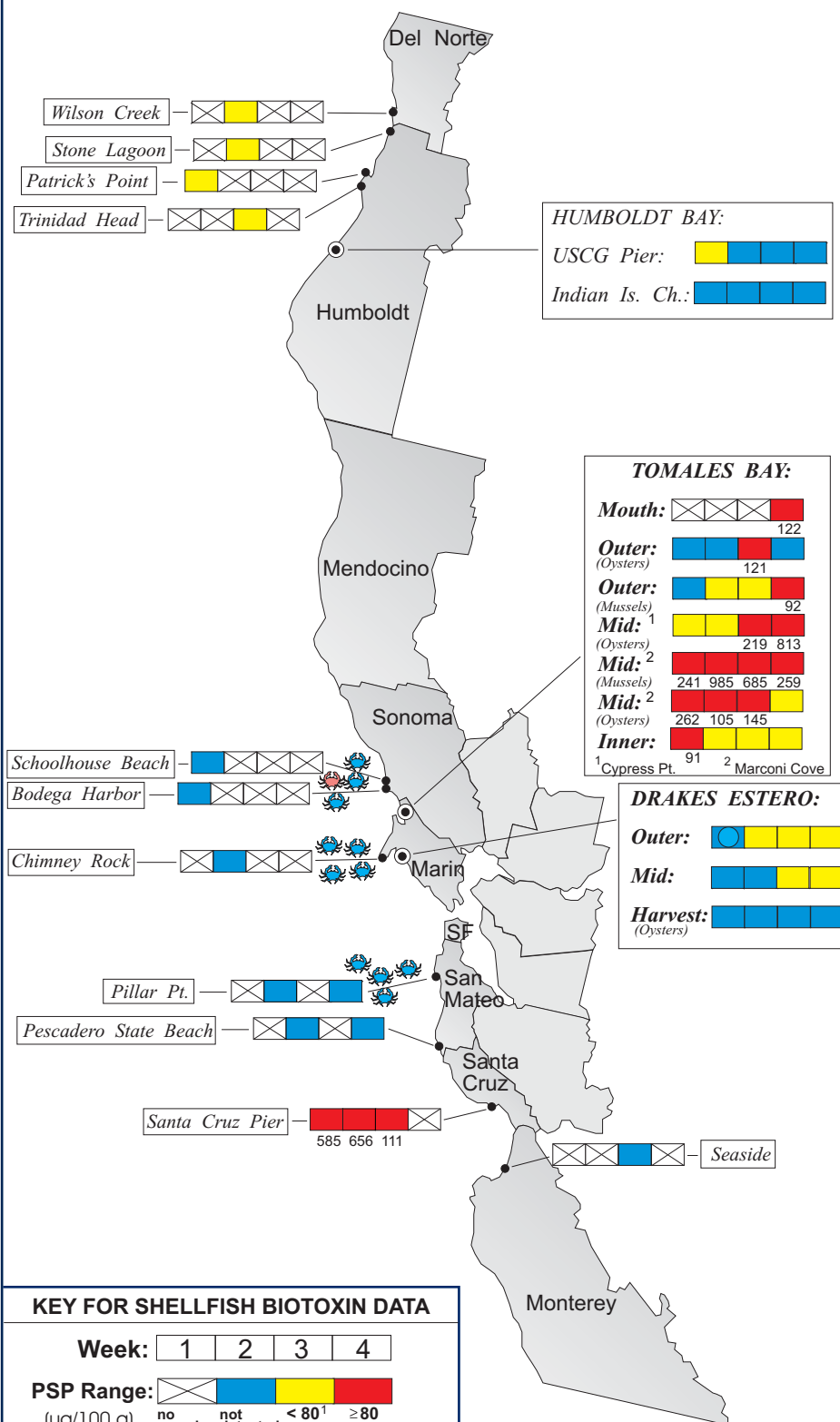


Table 1. Program participants collecting phytoplankton samples during December, 2013.

AGENCY	#	AGENCY	#
DEL NORTE COUNTY		Yurok Tribe Environmental Group	1
HUMBOLDT COUNTY		Coast Seafood Company	4
		Humboldt State University Marine Lab	3
		Yurok Tribe Environmental Group	1
MENDOCINO COUNTY		CDPH Volunteer (<i>Marie DeSantis</i>)	4
SONOMA COUNTY		Bodega Marine Lab & Farallone Institute	1
MARIN COUNTY		Drakes Bay Oyster Company	13
CDPH Marine Biotoxin Program	3	CDPH Volunteers (<i>Anderson, Clyde</i>)	5
SFSU, Romberg Tiburon Center	1	Hog Island Oyster Company	10
Golden Gate National Recreation Area	1	Sonoma State University	3
SAN FRANCISCO COUNTY		CDPH Volunteer (<i>Eugenia McNaughton</i>)	3
		Exploratorium	3
SAN MATEO COUNTY		The Marine Mammal Center (<i>Stan Jensen</i>)	5
San Mateo County Environmental Health Dept.	6		
SANTA CRUZ COUNTY		U.C. Santa Cruz	3
		Santa Cruz County Environmental Health	3
MONTEREY COUNTY		Friends of the Sea Otter (<i>Janis Chaffin</i>)	3
Marine Life Studies	3	Monterey Abalone Company	1
CDPH Volunteer (<i>Jerry Norton</i>)	1		
SAN LUIS OBISPO COUNTY		Friends of the Sea Otter (<i>Kelly Cherry</i>)	4
Morro Bay National Estuary Program	1	Grassy Bar Oyster Company	5
Coastal Discovery Center, San Simeon	2	Tenera Environmental	4
The Marine Mammal Center (<i>Webb</i>)	1		
SANTA BARBARA COUNTY		CDPH Volunteer (<i>Sylvia Short</i>)	3
HABNet/CDPH Volunteers (<i>Boyd Grant</i>)	5	Island Packers/HABNet	1
National Park Service	1	Santa Barbara Mariculture Company	5
		U.C. Santa Barbara	4
VENTURA COUNTY		CDPH Volunteer (<i>Fred Burgess</i>)	2
National Park Service	1		
LOS ANGELES COUNTY		CDPH Volunteers (<i>Kai Xu, Cal Parsons</i>)	4
Los Angeles County Health Department	3	Los Angeles County Sanitation District	2
ORANGE COUNTY		Amigos de Bolsa Chica	4
California Department of Fish and Wildlife	3	CDPH Volunteer (<i>Jennifer McCarthy</i>)	2
SAN DIEGO COUNTY		Carlsbad Aquafarms, Inc.	2
Scripps Institute of Oceanography	5	Tijuana River National Estuary Research	4
U.S. Navy Marine Mammal Program	3		

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Consumers of Washington clams, also known as butter clams (*Saxidomus nuttalli*), are cautioned to eat only the white meat. Washington clams can concentrate the PSP toxins in the viscera

and in the dark parts of the siphon and can remain toxic for a long period of time. Persons taking scallops or clams, with the exception of razor clams, are advised to remove and discard the dark parts (i.e.,

the digestive organs or viscera). Razor clams (*Siliqua patula*) are an exception to this general guidance due to their ability to concentrate and retain domoic acid in the edible white meat as well as in the viscera.

PSP toxins can produce a tingling around the mouth and fingertips within a few minutes to a few hours after eating toxic shellfish. These symptoms can be followed by disturbed balance, lack of muscular coordination, slurred speech and difficulty swallowing. In severe poisonings, complete muscular paralysis and death from asphyxiation can occur.

Symptoms of domoic acid poisoning can occur within 30 minutes to 24 hours after eating toxic seafood. In mild cases, symptoms of exposure to this nerve toxin may include vomiting, diarrhea, abdominal cramps, headache and dizziness. These symptoms disappear completely within several days. In severe cases, the victim may experience excessive bronchial secretions, difficulty breathing, confusion, disorientation, cardiovascular instability, seizures, permanent loss of short-term memory, coma and death.

Any person experiencing any of these symptoms should seek immediate medical care. Consumers are also advised that neither cooking or freezing eliminates domoic acid or the PSP toxins from the shellfish tissue. These toxins may also accumulate in the viscera of seafood species such as crab, lobster, and small finfish like sardines and anchovies, therefore these tissues should not be consumed. Contact the "Biotoxin Information Line" at 1-800-553-4133 for a current update on marine biotoxin activity prior to gathering and consuming shellfish.



Table 2. CDPH program participants submitting shellfish samples during December, 2013.

COUNTY	AGENCY	#
Del Norte	Yurok Tribe Environmental Program	1
Humboldt	Coast Seafood Company	8
	Yurok Tribe Environmental Program	1
	CDPH Volunteer (<i>Brett Stacey</i>)	1
	Humboldt County Environmental Health Department	1
Mendocino	None Submitted	
Sonoma	CDPH Marine Biotoxin Program	2
Marin	Cove Mussel Company	10
	Drakes Bay Oyster Company	26
	Hog Island Oyster Company	9
	Marin Oyster Company	4
	Point Reyes Oyster Company	14
	CDPH Marine Biotoxin Program	1
	Tomales Bay Oyster Company	7
	Starbird Mariculture	1
San Francisco	None Submitted	
San Mateo	San Mateo County Environmental Health Department	4
Santa Cruz	U.C. Santa Cruz	3
Monterey	CDPH Volunteer (<i>Josh Smith</i>)	1
San Luis Obispo	Grassy Bar Oyster Co.	12
	Morro Bay Oyster Company	7
Santa Barbara	Santa Barbara Mariculture Company	10
	Santa Barbara Seafood Station	9
	U.C. Santa Barbara	4
	Vandenberg AFB	1
Ventura	None Submitted	
Los Angeles	Los Angeles County Health Department, Burke Health Center	1
	Southern California Marine Institute	3
Orange	Orange County Health Care Agency	1
San Diego	Carlsbad Aquafarms, Inc.	5
	CDPH Volunteer (<i>Steve Crooke</i>)	1
	U.S. Navy Marine Mammal Program	4

PHYTOPLANKTON GALLERY



The diatom Corethron has only been observed from northern California sites and usually in low numbers.



Alexandrium, the PSP toxin-producer, and Ceratium furca were common inside Tomales Bay.



Zooplankton such as this copepod are occasionally caught in our phytoplankton samples.